Micrometeoroid and Orbital Debris Damage Recording System (IPPW-7)

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ABSTRACT

The purpose of the Micrometeoroid and Orbital Debris (MMOD) Damage Recording System project is to develop a reliable, mass and power efficient Thermal Protection System (TPS) impact detector to be integrated with manned and robotic spacecraft. The Columbia Space Shuttle accident in 2003 spurred an investigation that led to the requirement of an active impact monitoring system to be integrated with the spacecraft's TPS. With the development post Space Shuttle manned vehicles, MMOD impact damage has been classified as the highest risk to the vehicle and its crew.

Many MMOD impact detection systems have been developed and flown on satellites and probes dating back to the 1960s. Unfortunately none of these flight qualified systems have met the mass and reliability requirements presented by NASA. Therefore development of new systems is required for integration to the Space Shuttles successor.

This poster details the development of the Damage Recording System (DRS), a mass and power efficient solution to the MMOD impact detection requirements. Many thin film Embedded Damage Recorder (EDR) sensors have been designed and fabricated for test analysis at Hypervelocity Impact ranges across the United States. Test results have confirmed the EDR sensor and DRS system as a viable MMOD impact sensor. Vehicle integration and further space environment testing remain critical steps in maturing to flight qualification. Future work will address these steps individually to advance the DRS development into a complete system.